

# THE MIGRATORY BIRD TREATY ACT AND CONCERNS FOR NONTARGET BIRDS RELATIVE TO SPRING BAITING WITH DRC-1339

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**Abstract:** The regulatory responsibility for conservation of migratory birds has been delegated to the U.S. Fish and Wildlife Service (USFWS) by the Migratory Bird Treaty Act (MBTA). As a result, the USFWS has responsibility to evaluate programs that are developed to reduce damage caused by migratory birds. The agency has been evaluating a proposal to control blackbird populations in North Dakota and South Dakota, via a lethal spring baiting program using the avicide 3-chloro-p-toluidine, 3-chloro-4-methylaniline hydrochloride (DRC-1339). The underlying purpose of this blackbird control effort is to reduce sunflower crop damage. The USFWS developed regulations that would allow for the legal take of species that commonly cause depredation problems. The USFWS is authorized to issue depredation permits, which would provide a legal approach for spring baiting with DRC-1339. When evaluating any potential request for a depredation permit, USFWS will evaluate potential impacts to the birds targeted for control (target birds) and bird species that might be killed unintentionally (nontarget birds). An additional concern, is whether spring baiting can achieve the intended purpose of reducing red-winged blackbird populations and ultimately crop damage. Twenty-eight nontarget birds have been documented using fields that would be targeted for spring baiting. Half of these nontarget birds are granivorous species which might consume rice bait. In addition, some researchers have found that nontarget birds are attracted to baited plots. This information coupled with data regarding the sensitivity of some nontarget birds to DRC-1339 toxicity, provide the basis for concern USFWS has for nontarget bird impacts from spring baiting.

**Key words:** DRC-1339, Migratory Bird Treaty Act, nontarget birds, sunflowers, toxicity.

The Animal and Plant Health Inspection Service (APHIS) has been conducting research into approaches that might reduce sunflower crop damage in North Dakota and South Dakota that results from local nesting blackbird species that feed on ripening seeds. One approach that is currently being considered for operational application is the use of the avicide 3-chloro-p-toluidine, 3-chloro-4-methylaniline hydrochloride (DRC-1339), distributed as a rice bait in the vicinity of spring blackbird roosts in South Dakota (U. S. Department of Agriculture [USDA] 2001). This proposed control method is referred to as spring baiting. DRC-1339 is a slow-acting poison that affects the kidneys of sensitive birds and is attractive as an avicide because of reported high toxicity to many pest birds and relatively low toxicity to mammals (Ford 1967). The target species for this proposed control effort are the red-winged blackbird (*Agelaius phoeniceus*) and the common grackle

(*Quiscalus quiscula*) (USDA 2001). The objective of spring baiting is to kill 2 million red-winged blackbirds annually with the intent of reducing local nesting populations and sunflower crop damage (USDA 2001). Because access to the DRC-1339-treated bait cannot be controlled, other bird species (referred to as nontarget birds) may also visit the bait sites, eat treated bait, and suffer lethal or sublethal effects.

The U. S. Fish and Wildlife Service (USFWS) is involved in this issue because the regulatory responsibility for conservation of migratory birds has been delegated through the Department of Interior to the USFWS, by the Migratory Bird Treaty Act (MBTA). One of the primary conservation measures in the MBTA, is the prohibition against the taking of migratory birds unless permitted by regulations issued by the Secretary of Interior. The birds protected by the MBTA are those species which migrate across state or international

boundaries. This includes the majority of avian species in North America including the red-winged blackbird, yellow-headed blackbird and the common grackle, which are primarily responsible for causing damage to sunflower crops (USDA 1999).

### APPROACHES FOR CONTROLLING DEPREDATING BIRDS UNDER THE MBTA

The USFWS developed regulations that would allow for the legal take of species that commonly cause depredation problems. One of these regulations is the depredation order for blackbirds, cowbirds, grackles, crows, and magpies. This depredation order allows the lethal control of these species without a federal permit when these species are found committing or about to commit depredations upon various crops. The phrase "when found committing or about to commit depredations" prevents the legal application of this depredation order to spring baiting in the Dakotas, because the baiting would take place 4 to 5 months prior to the time when depredation occurs and is not selective solely for the birds that cause the damage.

However, the MBTA does authorize the USFWS to issue depredation permits for the take of avian species which cause crop damage, when the standing depredation order does not apply. Thus depredation permits would provide a legal approach for allowing spring baiting. Issuance of a depredation permit by the USFWS requires an evaluation of potential impacts both to target and to nontarget birds. A fundamental part of this evaluation is an assessment of the efficacy of spring baiting to reduce regional nesting blackbird populations and sunflower crop damage. If spring baiting cannot achieve these goals, its programmatic implementation would result in the unnecessary destruction of both target and nontarget birds. One of the primary concerns identified by USFWS during early evaluation of spring baiting is the effects that such a program might have on nontarget birds.

It is important to note that the MBTA does not provide a legal mechanism for incidental take of nontarget migratory birds. Thus a depredation permit could allow the take of blackbird species causing crop damage, but it does not allow the incidental take of nontarget birds which might die as a result of the blackbird control effort. Historically, the USFWS and the U. S. Department of Justice have used prosecutorial discretion in dealing with incidental take of migratory birds. USFWS will soon publish a proposed rule that would spell out procedures that might be used in the future to authorize incidental take that would result from the actions of federal agencies.

### WILL SPRING BAITING RESULT IN NONTARGET BIRD EXPOSURE?

Lethal spring baiting calls for the distribution of DRC-1339-treated rice baits (diluted with clean rice) in harvested corn, soybean, or sunflower fields, from late March to late April. The baiting would be conducted for approximately 40 days at up to 25 2-acre bait plots, in the vicinity of roosting areas in east-central South Dakota (USDA 2001). The concern for nontarget birds is that some species will feed in the baited plots and ingest a lethal or sublethal dose of DRC-1339. A 1994 environmental impact statement (USDA 1994) concluded that any birds that consumed DRC-1339-treated baits were at risk for lethal or sublethal effects. Thus the nontarget birds at greatest risk from spring baiting would be those that use fields during the baiting period, eat rice bait, and are relatively sensitive to DRC-1339.

The first step in evaluating the potential for exposure of nontarget birds is determining which birds use the fields that would be used for baiting. Nontarget bird use of harvested corn and soybean fields, in the vicinity of spring blackbird roosts, has been the focus of several studies conducted from 1994 to 1999 (Linz 1995, Kenyon 1996, Knutsen 1998, Smith 1999, Linz et al. 2001, Linz et al. 2002). Twenty-eight nontarget species have been observed in harvested corn and soybean fields during these studies (Table 1). These species represent a variety of avian families and feeding guilds. Nontarget birds that are primarily granivores in the spring are the species that are primarily at risk for exposure to DRC-1339-treated rice. Of the 28 species listed in Table 1, half are primarily granivorous or feed primarily on seeds or waste grain during the spring months (e.g., western meadowlark [*Sturnella neglecta*]). Several omnivorous species are also known to feed on seeds and waste grain.

**Table 1. Nontarget birds species observed in treatment plots in eastern South Dakota from 1994-1999 and rank according to frequency of occurrence (Kenyon 1996, Knutsen 1998, Smith 1999, and Linz et al. 2001).**

Feeding guild	Nontarget species (Rank order for frequency of occurrence)	
Granivorous	American tree sparrow (1)	Mallard (7)
	Western meadowlark (2)	Lapland longspur (8)
	Ring-necked pheasant (3) <sup>1</sup>	Vesper sparrow (9)
	Dark-eyed junco (5)	Clay-colored sparrow (NR <sup>a</sup> )
	Song sparrow (5)	Snow bunting (NR)
	Mourning dove (6)	Gray partridge (NR)
	Savannah sparrow (7)	Chipping sparrow (NR)
Omnivorous	American robin (4)	Green-winged teal (9)
	American coot <sup>1</sup> (4)	Northern shoveler (9)
	Horned lark <sup>1</sup> (6)	Wood duck (9)
	American pipit (7)	
Insectivorous	Killdeer (4)	Least sandpiper (NR)
	Downy woodpecker (6)	Common snipe (NR)
	Northern flicker (7)	
Herbivorous	Canada goose <sup>2</sup> (3)	American wigeon <sup>2</sup> (NR)

<sup>1</sup>Upland game bird, not covered by MBTA

<sup>2</sup>Will feed on seeds and waste grains. <sup>a</sup>NR=Not Ranked

The nontarget species most frequently seen in harvested fields varied somewhat from year to year, however, some trends have been identified (Linz et al. 2001) (Table 1). Linz et al. (2001) summarized the frequency of occurrence of nontarget birds observed in cornfields over 5 years. Some of the most frequently observed species (in rank order) are the American tree sparrow (*Spizella arborea*), western meadowlark, Canada goose (*Branta canadensis*), ring-necked pheasant (*Phasianus colchicus*), American robin (*Turdus migratorius*), killdeer (*Charadrius vociferus*), American coot (*Fulica americana*), dark-eyed junco (*Junco hyemalis*), song sparrow (*Melospiza melodia*), mourning dove (*Zenaidura macroura*), downy woodpecker (*Picoides pubescens*), and horned lark (*Eremophila alpestris*). Half of these most frequently occurring nontarget species are granivorous species.

Another important issue that was evaluated in these nontarget observation studies (Kenyon 1996, Knutsen 1998, Smith 1999) is whether nontarget birds use rice-baited plots preferentially over nonbaited plots. In 4 out of 6 years, nontarget bird use of baited plots was significantly greater than reference plots (Knutsen 1998, Smith 1999). The results of Smith's study (1999) are of particular interest because 91% of the nontarget granivores were observed in treated plots. The most common granivorous species observed in the treated plots were house sparrows (*Passer domesticus*), American tree sparrows, dark-eyed juncos, song sparrows and unidentified sparrows (representing 67, 19, 6, 4 and 3 percent, respectively, of the nontarget granivores observed) (Smith 1999). These studies indicate that not only do nontarget birds use baited fields, some granivorous species are attracted to the baited plots.

A second step in evaluating exposure of nontarget birds is determining if they eat rice bait. The fact that many of the most common nontarget birds visiting the baited fields are granivores, provides an indication that rice consumption by some species would be expected. Smith's (1999) observation that 84% of granivores were feeding in baited plots provides further evidence that certain nontarget birds may consume rice bait. Few studies have documented rice consumption by nontarget birds, although Avery et al. (1998) confirmed that ring-necked pheasants will eat rice bait.

The USFWS funded a study in 1999 and 2000, to determine if nontarget birds were eating rice bait at fall sites baited with DRC-1339-treated rice (Custer et al. 2003). Nontarget birds were collected and their gastrointestinal tracts were examined for rice grains. In this study, 5 species were collected [savannah sparrows (*Passerculus sandwichensis*), vesper sparrows (*Pooecetes gramineus*), grasshopper sparrows (*Ammodramus savannarum*), rock doves (*Columba livia*), and mourning doves] and all but the rock dove had eaten rice bait. In 1999, 11 individuals of the 3 sparrow species were

collected and all but 3 of these birds had rice in their gastrointestinal tract. All of these species have been observed at spring-baited fields. Limited collections of nontarget birds were conducted at spring bait plots in 2002 (Custer et al. 2003) during which 3 nontarget bird species were collected [northern flicker (*Colaptes auratus*), song sparrow, and American robin]. The only granivore of these 3 (the song sparrow) had eaten rice bait. Ideally, more data should be gathered regarding rice consumption of nontarget birds.

A final consideration regarding nontarget bird exposure is the number of nontarget birds by species that might be expected to use the baited fields and thus potentially be exposed to DRC-1339. The observational studies conducted from 1994 to 1999 (Kenyon 1996, Knutsen 1998, and Smith 1999) typically had total nontarget bird counts that were in the low hundreds. As expected, these studies were designed to sample the temporal and spatial scales. Thus the results from these studies represent a fraction of the numbers of nontarget birds that might actually use baited fields during an operational program. No attempts have been made to extrapolate the numbers from these studies to the temporal and spatial scales proposed for an operational program (i.e., 40 days and 16 ha). Linz et al. (2001) provide data on the mean number of individuals observed per hour for a 0.2 ha area by species (e.g., 1.61 American tree sparrows observed per hour). Although these means per hour appear low, extrapolation to 40 days (assuming 12 hours of daylight) of baiting across 16 ha, suggests that thousands of American tree sparrows, western meadowlarks, and mourning doves might use the baited plots over the length of a spring baiting effort. Although this is a rough estimate, it appears that significant numbers of certain nontarget birds would be exposed to treated baits.

Some important questions regarding the potential for nontarget bird exposure during spring baiting have been answered. Twenty-eight species of nontarget birds have been observed at spring feeding sites, half of these species are primarily granivorous, the species that are most frequently seen at these sites are granivorous, in most years granivorous species are attracted to baited plots, some species are known to eat rice and it appears that significant numbers of nontargets might use baited fields. These facts provide a sound basis for concern that nontarget birds will be exposed to DRC-1339-treated rice baits. The next step is to evaluate the sensitivity of nontarget birds to DRC-1339.

## WHICH NONTARGET BIRDS ARE SENSITIVE TO DRC-1339?

The toxicity of DRC-1339 to nontarget birds has been evaluated in numerous studies. A majority of these studies were conducted by USFWS researchers in the



1960s and 1970s. Despite the volume of toxicity information, the USFWS was concerned that these studies were not designed to evaluate the risks of DRC-1339 to nontarget birds for large scale baiting efforts. Thus USFWS contracted with the Colorado Cooperative Fish and Wildlife Research Unit (CCFWRC) to evaluate many of the past acute, chronic, and field toxicity studies to determine the strengths and weaknesses of these studies (E. A. Harrahy. 2001. A critical review of the literature on the effects of DRC-1339 on nontarget birds with special emphasis on experimental design, analysis, and inference. Unpublished report, Colorado Cooperative Fish and Wildlife Research Unit, Fort Collins, Colorado, USA 2001).

Harrahy (2001) evaluated 73 papers. Harrahy's review determined that there were study design flaws for many of the older toxicity studies. Some of the typical flaws were small sample sizes, lack of replication, undocumented study design, lack of controls, and low number of treatment levels. As a result, some older LD<sub>50</sub> studies must be viewed with caution and may not be suitable for extrapolating to other taxonomically related species. A critique of Harrahy's (2001) report was submitted to the USFWS (Mark Tobin, National Wildlife Research Center, Fort Collins, Colorado, personal communication) and a response prepared by Harrahy (Elisabeth Harrahy, CCFWRC, Fort Collins, Colorado, personal communication). The conclusions regarding study design flaws of some older studies and cautions regarding their use for evaluating risk to nontarget birds, however, remains the same.

In addition, USFWS biologists were concerned that there was a paucity of toxicity studies for many of the passerine species that were commonly observed in the spring-baited fields. As a result, the USFWS and APHIS had definitive acute oral toxicity studies conducted for 4 passerine species, by an independent laboratory. The species tested included the American tree sparrow, the western meadowlark, the horned lark and the dark-eyed junco. These new studies combined with 2 existing studies provide some insight into the nontarget species that are sensitive to low concentrations of DRC-1339 (Table 2).

The 6 nontarget birds presented in Table 2 are some of the species that are most likely to occur at bait sites (Linz et al. 2001). Of these 6, 4 are highly sensitive to DRC-1339 (LD<sub>50</sub> ≤ 10 mg/kg of body weight). In particular, the LD<sub>50</sub>s for the American tree sparrow, western meadowlark, and mourning dove are very similar to the red-winged blackbird. The ring-necked pheasant is only slightly less sensitive than these 3 species. The horned lark and dark-eyed junco have low sensitivity to DRC-1339. In addition to their sensitivity to DRC-1339, the American tree sparrow, western mead-

**Table 2. Toxicity and relative sensitivity of nontarget birds, frequently observed in spring-baited fields, compared to the red-winged blackbird.**

Nontarget Species	LD <sub>50</sub> (mg/kg body wt.)	LD <sub>50</sub> 95% Confidence interval (mg/kg body wt.)	Species relative sensitivity	Likely to consume rice?
Red-winged blackbird <sup>a</sup>	1.8-3.2	Not Given	High sensitivity	Yes
American tree sparrow <sup>b</sup>	3.5	0.0-5.1	High sensitivity	Yes
Western meadowlark <sup>c</sup>	4.01	Not Given	High sensitivity	Yes
Horned lark <sup>d</sup>	232.0	120-366	Low sensitivity	Yes
Dark-eyed junco <sup>e</sup>	162	121-290	Low sensitivity	Yes
Mourning dove <sup>f</sup>	3.16	Not given	High sensitivity	Yes
Ring-necked pheasant <sup>f</sup>	10	Not given	High sensitivity	Yes

<sup>a</sup> DeCino et al. 1966

<sup>b</sup> J. J. Mach. 2001. DRC-1339: An acute oral toxicity study with the American tree sparrow (*Spizella arborea*). Unpublished report, Genesis Laboratories, Wellington, Colorado, USA.

<sup>c</sup> J. Borchert. 2001. DRC-1339: An acute oral toxicity study with the western meadowlark (*Sturnella neglecta*). Unpublished report, Genesis Laboratories, Wellington, Colorado, USA.

<sup>d</sup> R. W. Sayre. 2001a. DRC-1339: An acute oral toxicity study with grassland birds: the horned lark (*Eremophila alpestris*). Unpublished report, Genesis Laboratories, Wellington, Colorado, USA.

<sup>e</sup> R. W. Sayre 2001b. DRC-1339: An acute oral toxicity study with the dark-eyed junco (*Junco hyemalis*). Unpublished report, Genesis Laboratories, Wellington, Colorado, USA.

<sup>f</sup> In C. E. Knittle. 1989. Summary of currently available avian single-dose oral LD<sub>50</sub> data for the chemical 3-chloro-4-methylbenzenamine hydrochloride (Compound DRC-1339:CPTH). Denver Wildlife Research Center Unpublished Special Report No. 2., Denver, Colorado, USA.

owlark, mourning dove, and ring-necked pheasant are granivorous and would likely eat rice bait. Thus these 4 nontarget avian species are the ones that are at greatest risk for lethal effects resulting from DRC-1339 exposure. Because the dose received is related, in part, to body size (smaller bodied birds receive a greater dose for a given amount of avicide), smaller bodied birds will be at greater risk for adverse effects. Therefore, the American tree sparrow, western meadowlark, and the mourning dove are the species that would be expected to suffer the greatest losses.

Based on these concerns for nontarget birds, the USFWS has contracted with the U.S. Geological Survey-Biological Resources Division's Columbia Environmental Research Center for the development of a quantitative risk assessment for nontarget birds. The USFWS will carefully evaluate the potential effects on nontarget birds in light of concerns regarding target species and the efficacy of spring baiting to achieve intended goals to reduce blackbird nesting populations and crop damage, when deciding on the appropriateness of a depredation permit.

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